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SYSTEM FOR SECURING THE MOVABLE JAW OF A CONE OR GIRATORY
CRUSHER

The present invention relates to a system for securing
5 the movable jaw of a cone or gyratory crusher. Cone
crushers and gyratory crushers are adapted for mine or
quarry installations and serve for the reduction of the
size of the granulates and minerals to the dimensions
required for their ultimate use.

10 They comprise a truncated conical crushing bowl, whose
wall supports a fixed jaw, and a conical head bearing the
movable jaw mounted on a shaft coaxial to the bowl. The
geometrical axis of the conical head forms at the summit of
this latter a certain angle with the axis of the principal
15 shaft, which gives to the head, when the eccentric turns, a
nutatory movement. During descent into the bowl, the
materials are progressively crushed so as to reach the
dimension of the smallest space r between the fixed jaw and
the movable jaw, at the level of the base of the head in
20 nutation and located at 2 in Figure 1 showing a cone
crusher.

The cone crusher according to Figure 1, comprises a
supply hopper 8 located above the opening 1 of a crushing
chamber or bowl 3. The crushing head 5 is supported by a
25 shaft 10 above a bearing for this latter, with its
geometric axis forming, thanks to an eccentric 12, an axis
 α with the axis of the shaft so as to have a nutatory
movement when the eccentric 12 turns. The fixed jaw 11 is
fixed below the opening 1, in the upper part of the bowl 3.

30 The movable jaw 4 is mounted on the head 5 and rests
in its lower portion on the head 5, whilst it is gripped at
its upper portion on the head by a screw 6, by means of a

ring 7. This gripping is effected by a component of the gripping force of the screw 6 directed along the generatrix of the cone of the movable jaw 4.

5 In the course of the crushing operation, the pieces which wear down the most quickly are the jaws and particularly this movable jaw 4. Because of this, the latter must be periodically changed after wear. Thus, when the material to be crushed is constituted by pure silica, the lifetime of the jaw 4 cannot exceed several tens of
10 hours. On the other hand, when it is a matter of limestone, this lifetime can extend to several years.

To this end, it is fixed immovably on the head by means of the screw 6. This gripping of the screw 6 requires a very high force so as to avoid the jaw knocking
15 against the head. To grip it, there is generally used a key on which the operator taps with a sledgehammer. Moreover, in the course of operation, the movable jaw 4 has the tendency to turn on the head but, with this movement, it drives the screw 6 which self locks while holding the
20 jaw. The self locking of the screw ensures that disassembly also requires the application of a very high force. So as to facilitate disassembly, a ring 7 is interposed between the screw head and the upper edge of the movable jaw. For disassembly, this ring is cut with a
25 blowtorch and removed with a suitable tool, which frees the screw but which can then turn freely.

So as to facilitate assembly and disassembly of the jaw, according to French patent application No. 02 09256, the securement system comprises a blocking element, whose
30 diameter is at least equal to that of the summit of the cone of the movable jaw, which is provided with holes spaced about its periphery, into which are threaded screws

which screw into tappings located in the head or are pre-secured with this latter.

According to one embodiment of the cone crusher disclosed in that application, the blocking element is constituted by two parts, by a blocking plate provided with
5 holes distributed about its periphery, and a blocking stud located therebelow, screwed into an axial tapping in the head and secured in rotation with said plate, the gripping taking place by means of screws passing through the holes
10 of the plate and locking into the tappings provided in the blocking stud.

With further respect to that application, in the case of a gyratory crusher, the blocking element is constituted by a blocking ring provided with holes distributed about
15 its periphery; a blocking nut, screwed on the shaft above the head and secured in rotation with said blocking ring, the gripping taking place by means of screws passing through the holes of the blocking ring and screwing into the tappings provided in said blocking nut.

20 The solution according to that mentioned application is quite suitable to facilitate assembly and disassembly of the movable head. However, strong gripping is still necessary to prevent the jaw from turning relative to the blocking plate or relative to the gripping nut (gyratory
25 crusher). There must accordingly be found a solution to the problem of securing in rotation the plate (or the nut) and the jaw.

To solve this problem, the present invention provides in a system that said element has on its external periphery
30 radially outwardly directed notches regularly spaced about said periphery, and that the movable jaw has, on its internal periphery, at the level of its opening, lugs

directed radially inwardly, regularly spaced about said periphery and of a number equal to said notches, the lugs in the assembled condition being disposed in said notches so as to secure the blocking element and the movable jaw in rotation during operation of the crusher.

According to the invention, the number of lugs and notches is preferably equal to four. It can however be fewer or more, given that the number of notches is at least equal to the number of lugs.

The invention will be better understood from a non-limiting embodiment described hereafter and shown in the accompanying drawings, in which are shown:

Figure 1: A schematic cross-section of a cone crusher according to the prior art;

Figure 2: A top perspective view of the movable jaw according to the present invention;

Figure 3: A schematic cross-section of the securement of the movable jaw of a cone crusher according to the invention;

Figure 4: A cross-sectional view on the line IV-IV of Figure 3.

As shown in Figure 3, the movable jaw 4 is disposed on the conical head 5 and conventionally rests, as shown in Figure 1, on the lower wide portion of the conical head.

Its gripping in this position takes place by means of a blocking element constituted by a screw in two parts, a blocking plate 16 whose diameter is at least equal to the external diameter, at its upper portion, of the cone formed by the jaw 4 and a screw-threaded lug 13 secured to the plate by screws 17.

A protective cap 23 for the heads of the screw 17 is also provided on the blocking plate and simply fixed on this latter with a screw.

5 As is indicated above for the prior art, the rotation of the jaw 4, during operation relative to the head 5, produces a self-gripping of the piece 16, 13 and thus permits holding a suitable gripping despite wear of the jaw.

10 However, in operation, when the jaw 4 slides on the head despite substantial gripping, it also slides relative to the blocking plate 16 in its rotation. This latter then only partially transmits the rotational couple to the lug 13 by the screws 17.

15 To ensure securement of the jaw 4 and the blocking plate 16, the lugs 14 are provided on the internal periphery of the jaw 4 at the level of its upper opening. Notches 15 are of corresponding shape and equal number are provided on the periphery of the blocking plate 16. Notches and lugs are regularly spaced about said
20 peripheries so as to engage with each other.

In this way, during operation of the crusher, a rotation of the jaw 4 gives rise to a rotation of the blocking element 16 and a self-gripping of the couple constituted by the blocking plate 16 and the lug 13, hence
25 a self-gripping of the jaw 4 on the head 5.

The same system of lugs and notches can be applied to the gyratory crusher, to secure the gripping lug and the jaw together.

30 Figure 4 shows a cross-section of the system at the level of the opening of the cone forming the jaw 4. In the illustrated example, four lugs and four notches are

provided. But there could be provided a lesser or a larger number of lugs and notches.